



University of Idaho

College of Engineering

ALTERNATE AQUACULTURE VACCINE DELIVERY SYSTEM

TEAM FISH VAC

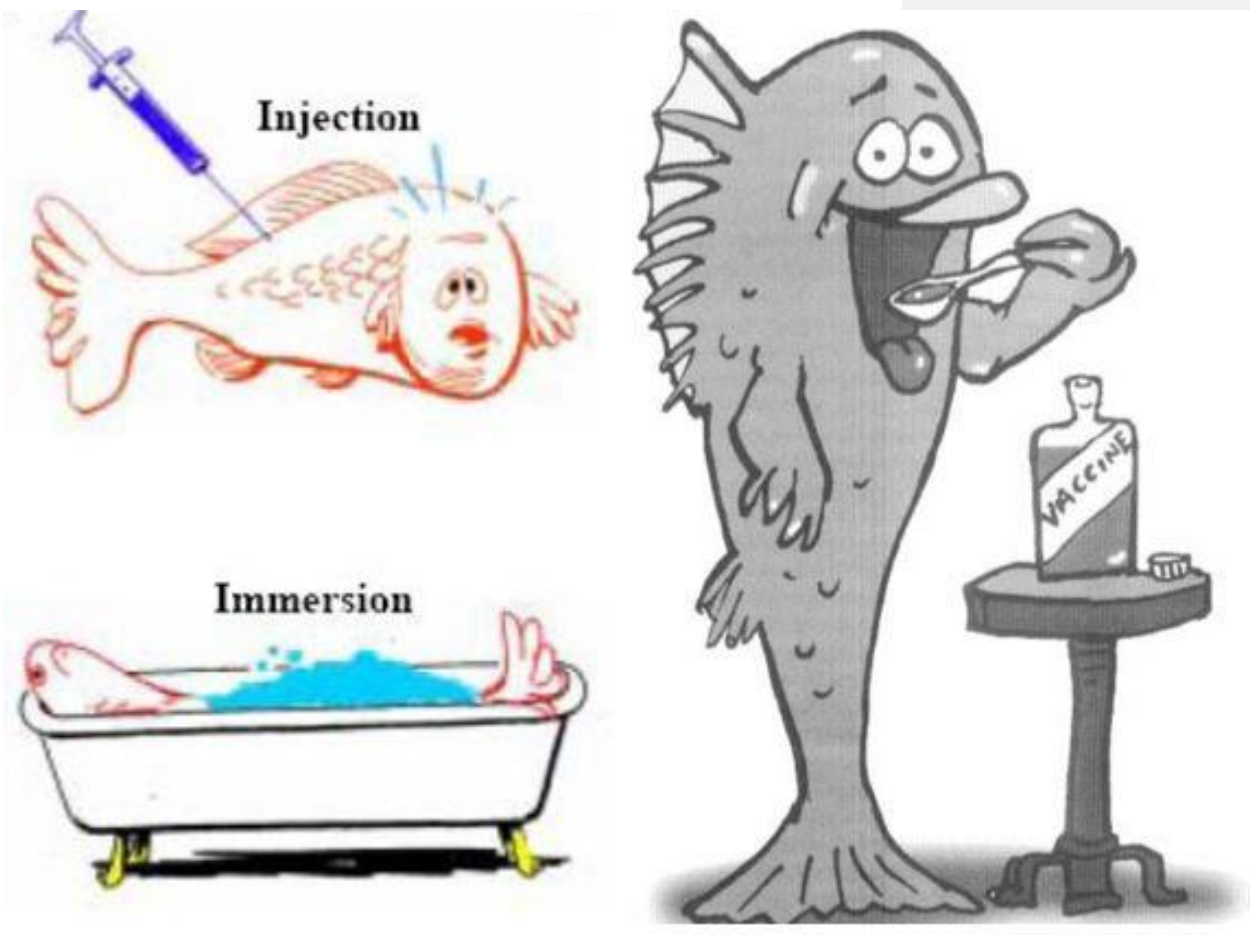
BEN, CODY, HASAN, KHARI

PROBLEM BACKGROUND

Preserving health in animal kingdoms requires the assistance of a diverse group of specialists. With the innovation in technology, we can use this to combat diseases in natural habitats. As a team of engineers, it is our jobs to design and construct instruments that improves the ease of field work. In our case, assisting the College of Natural Resources.

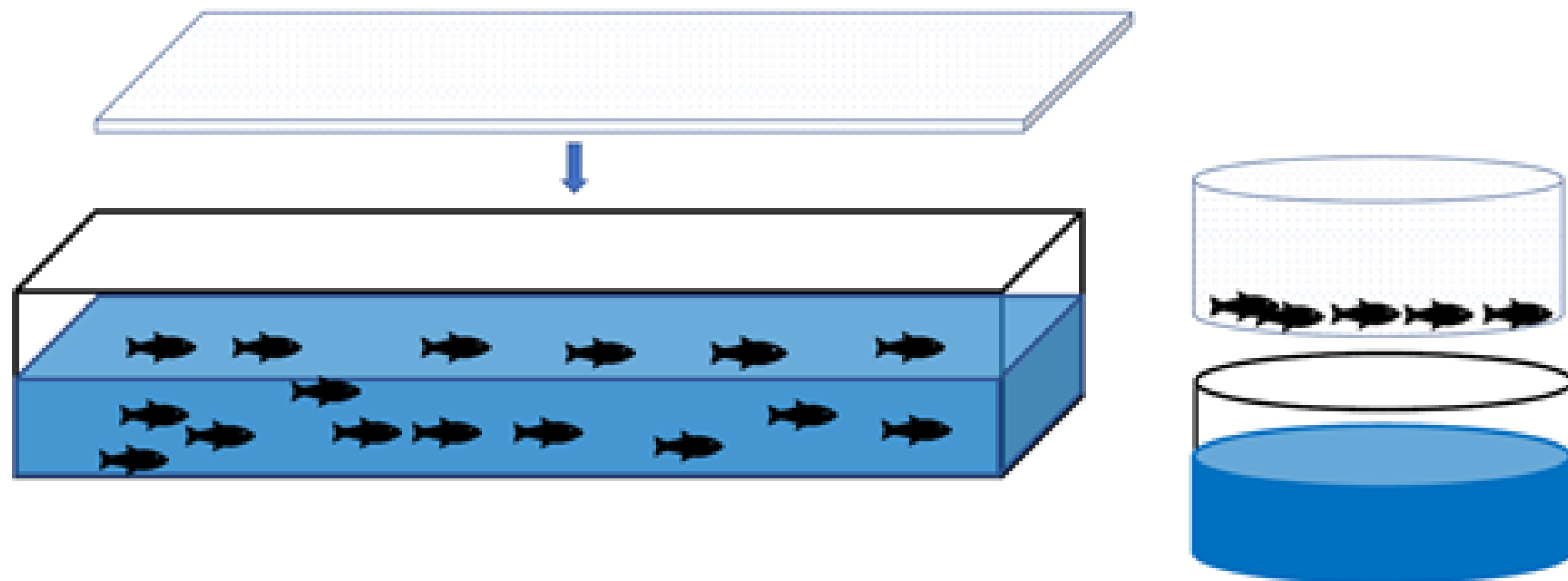


INITIAL CLIENT INTERVIEW



In our in-depth informational with Dr. Ken Cain, he updated the team with a technical background.

- 3 ways to vaccinate fish: Injection, Oral, and Immersion.
- The immersion technique is used when treating large schools of fish
- When using this method, the immersion time and effectiveness correlate due to the skin-vaccine contact. It takes time for the skin to absorb the treatment.
- The most ideal way to shorten the immersion time without decreasing the effectiveness, would be to perforate the skin of the fish harmlessly, and continue with the process



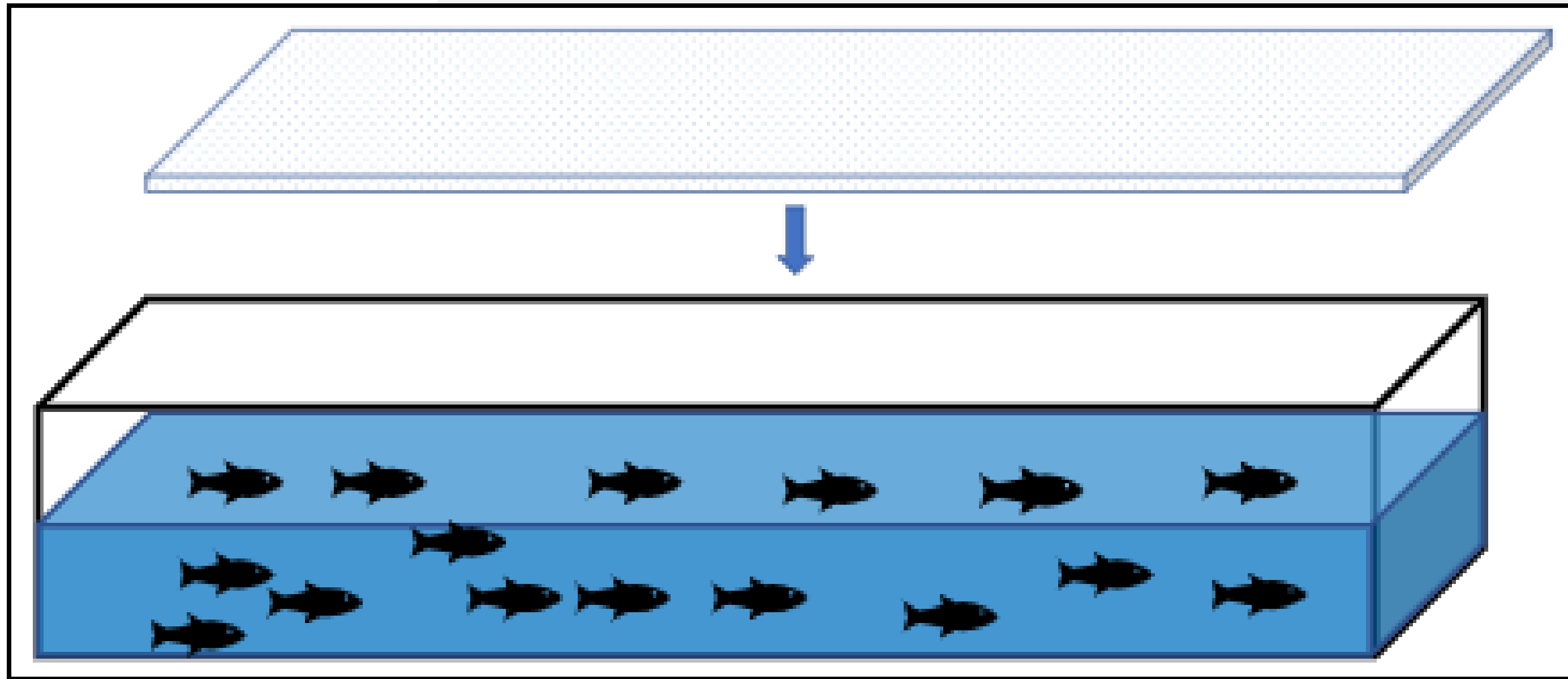
PROJECT REQUIREMENTS

- Should be used with existing vaccination tanks
- Should contain non-specific parts where possible to allow for easy repair
- Two Prototypes (Lab model and production model)
- Should be able to be operated and moved by the average person



INITIAL DESIGN CONCEPT

BED OF NEEDLES:



- Requires water to be drained from the tank or a large platform to be lowered into tank
- Would require 1000's of needles
- A bed of needles isn't a readily available item

MICRONEEDLE ROLLERS



After coming up empty handed with Microneedle sheets, we ran into a common and popular skin treatment method: Derma-Rolling or Micro-Needling.

This product is a small cylindrical roller with exposed microneedles. This product is commonly used to pierce the skin of humans, to agitate, and promote collagen in areas.

Advantages of this Product

- Adjustable
- Easily Replaceable
- Applicable
- Cheap

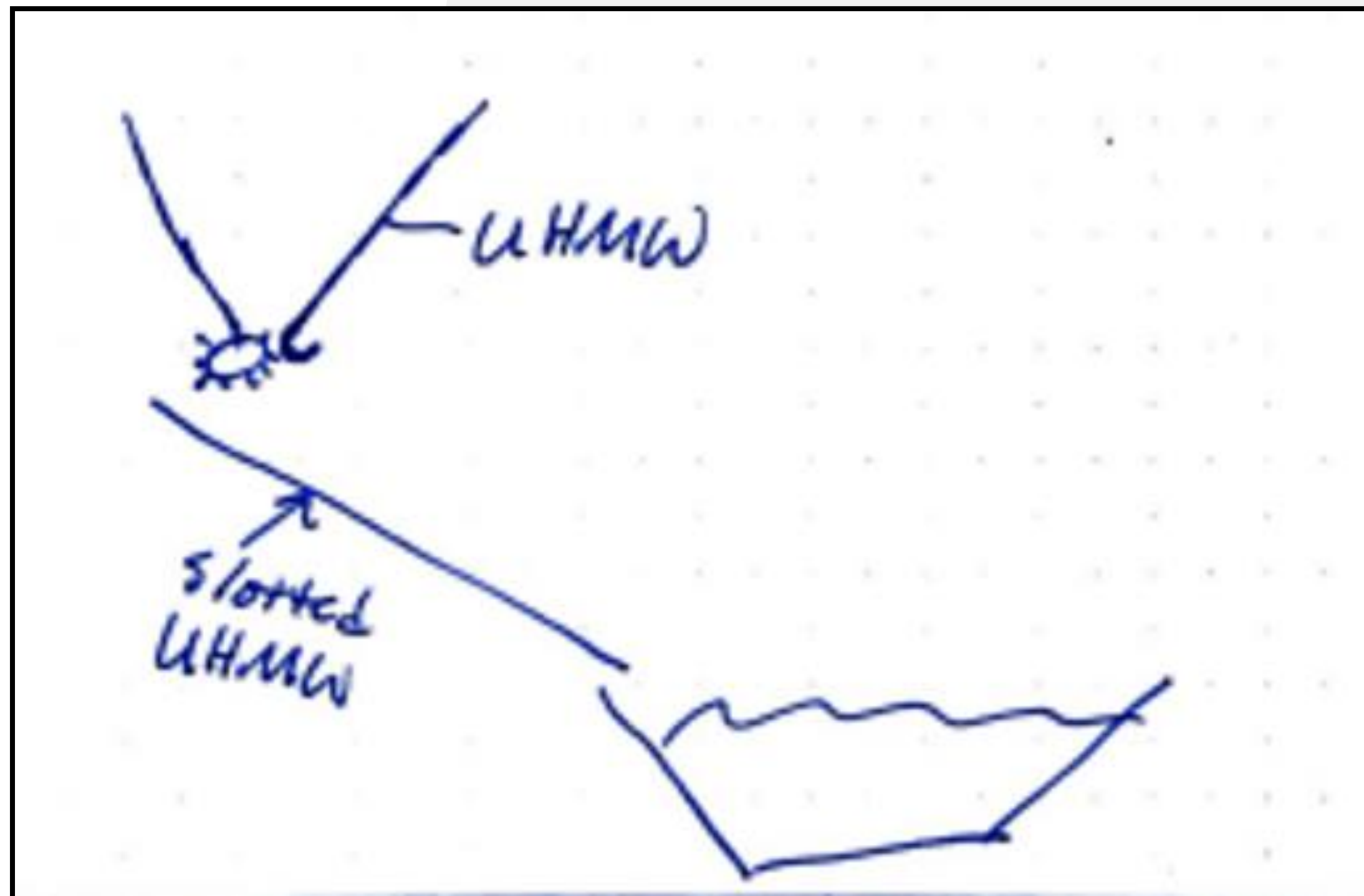
VALUE PROPOSITION



- Vaccinating large quantities of fish efficiently saves money and strenuous effort
- It is our responsibility to support our ecosystems and resources
- Creating an instrument that is easy to use and cheap to maintain is important for the consumer and the supplier.
- An effective and well-engineered product is our goal.

DESIGN IDEAS IMPLEMENTING USE OF MICRONEEDLE ROLLERS

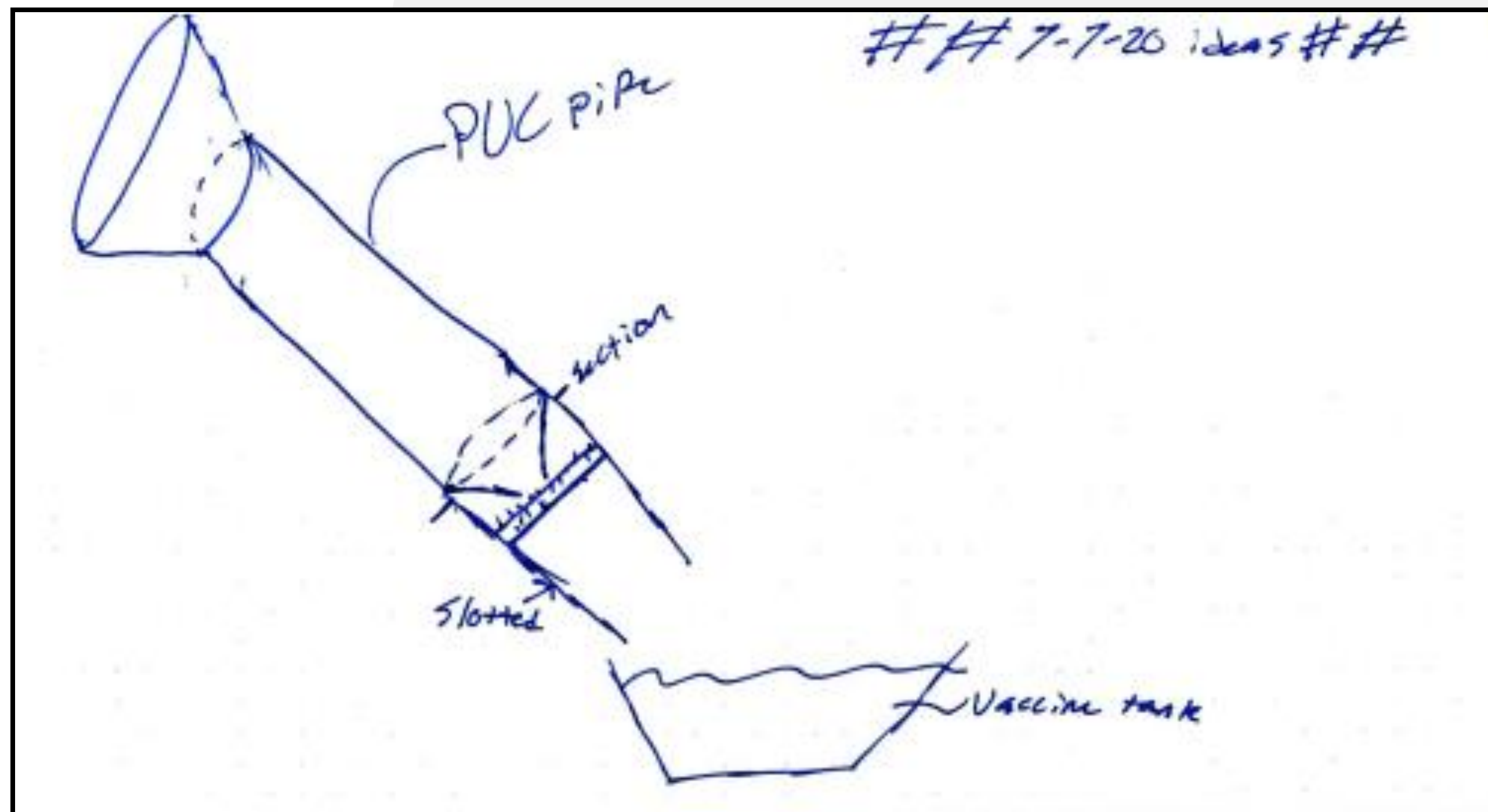
CHUTE AND RAMP:



- Fish are poured into top of chute with water
- The slot at the bottom has 1 needle roller and 1 smooth roller that the fish will roll over
- Fish exit the chute, and slide down a slotted ramp into the vaccine

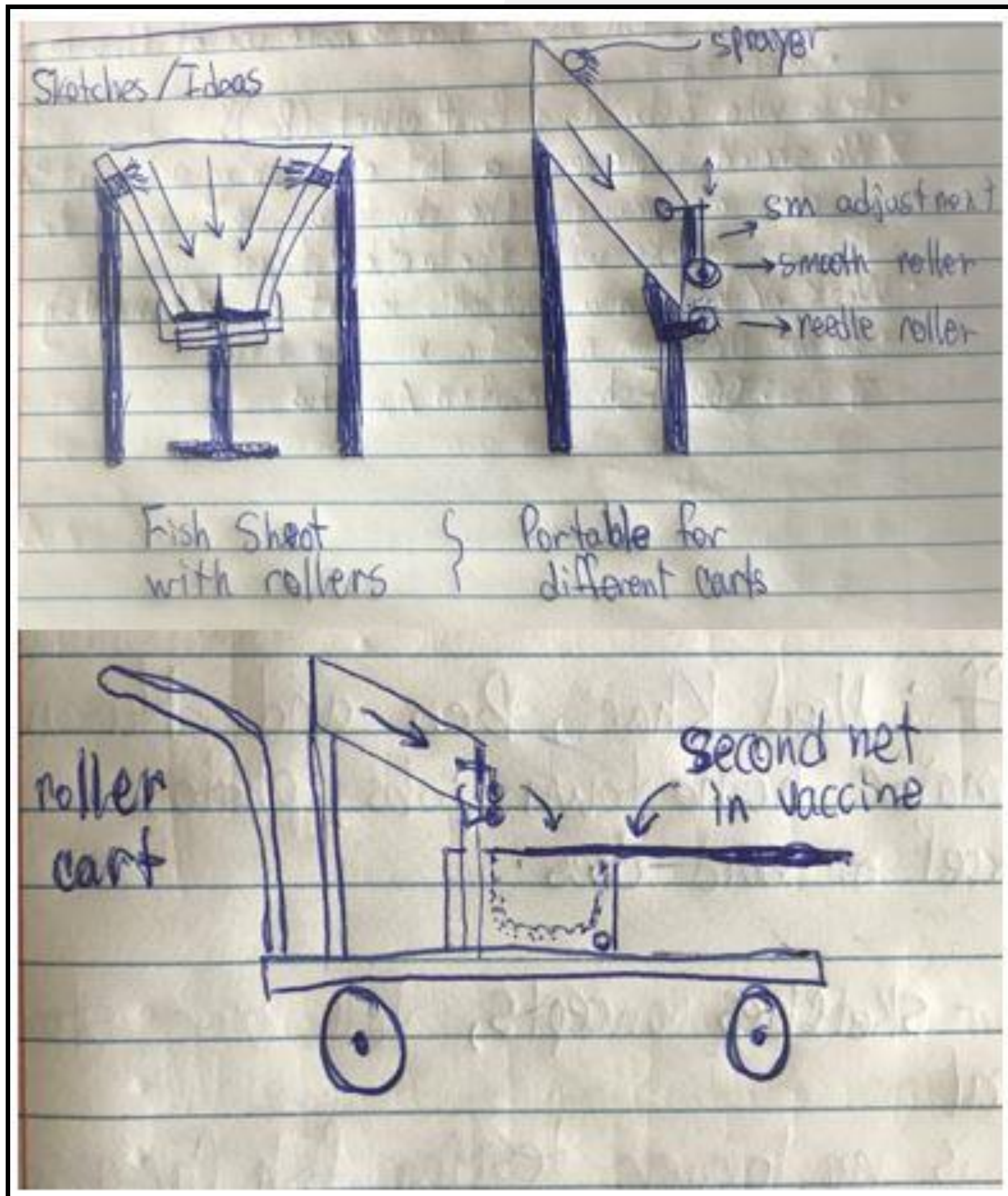
DESIGN IDEAS IMPLEMENTING USE OF MICRONEEDLE ROLLERS CONT.

PIPE AND FUNNEL:



- Fish are poured into the funnel with water
- A cone within the pipe will direct fish into a needled roller located at the exit of the cone
- Pipe below the cone will have perforations that will drain off excess water as fish slide into vaccine

DESIGN IDEAS IMPLEMENTING USE OF MICRONEEDLE ROLLERS CONT.



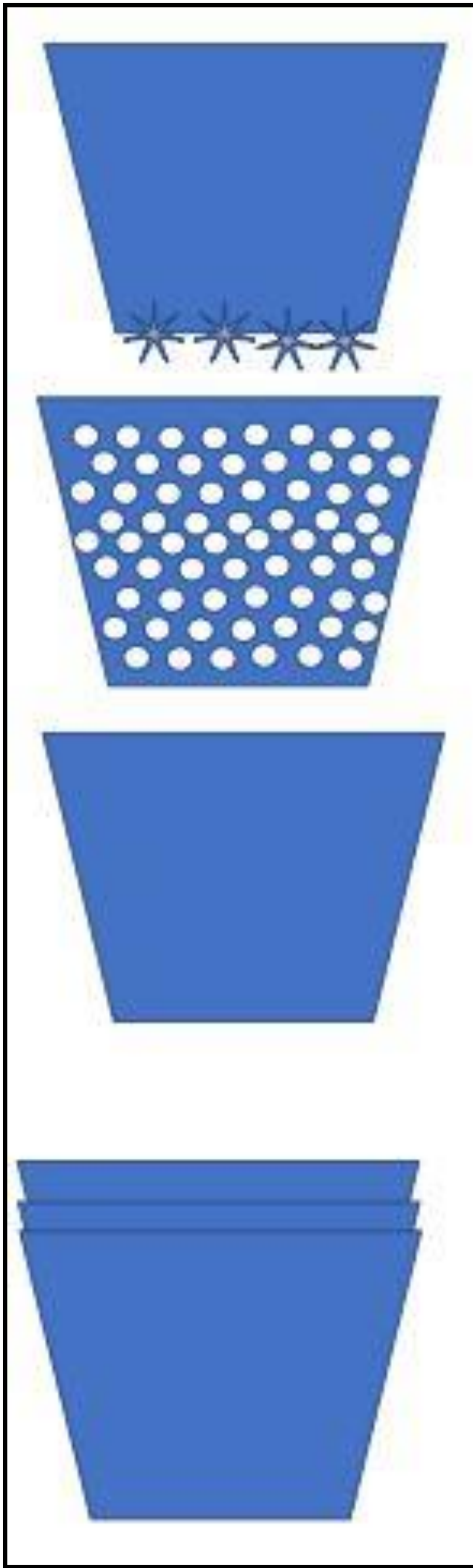
PORTABLE CHUTE AND CART:

- Fish are poured into the top of the chute
- A small sump pump inside of the tank will supply to sprayers with vaccine solution to assist with fish sliding down the chute
- A stationary needle roller and adjustable smooth roller will be located at the chute exit
- As fish exit, they will fall into a net submerged in the vaccine tank
- The chute will be able to mount to a cart for easy transportation
- Tanks will vary in sizes and will be removable

DESIGN IDEAS IMPLEMENTING USE OF MICRONEEDLE ROLLERS CONT.

STACKABLE BASKETS:

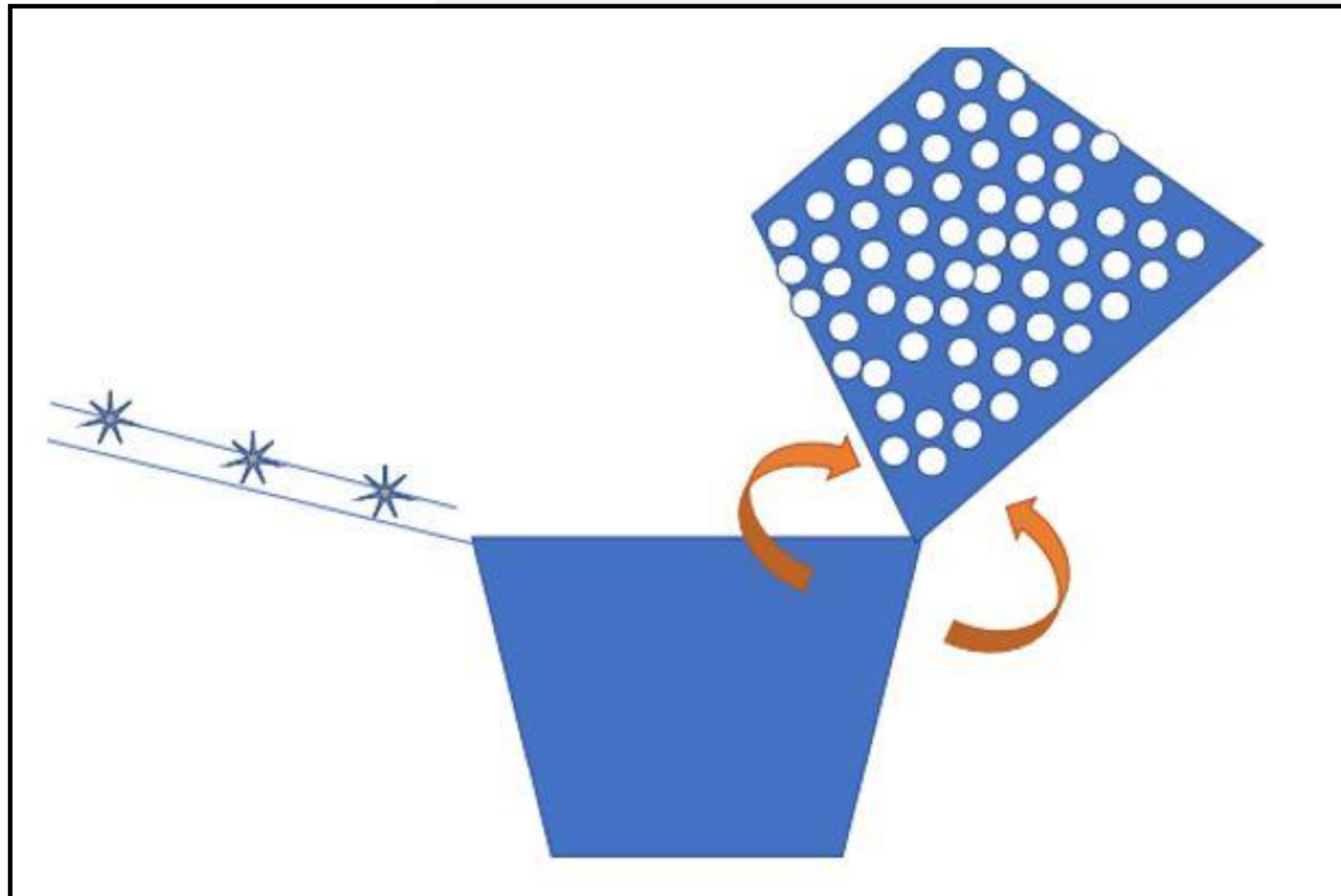
- Fish are poured into the stacked baskets
- Fish fall through the top basket and pass a series of needled rollers as the basket is lifted
- Middle basket is perforated and allows the fish to be removed from the vaccine tub without draining the vaccine



DESIGN IDEAS IMPLEMENTING USE OF MICRONEEDLE ROLLERS CONT.

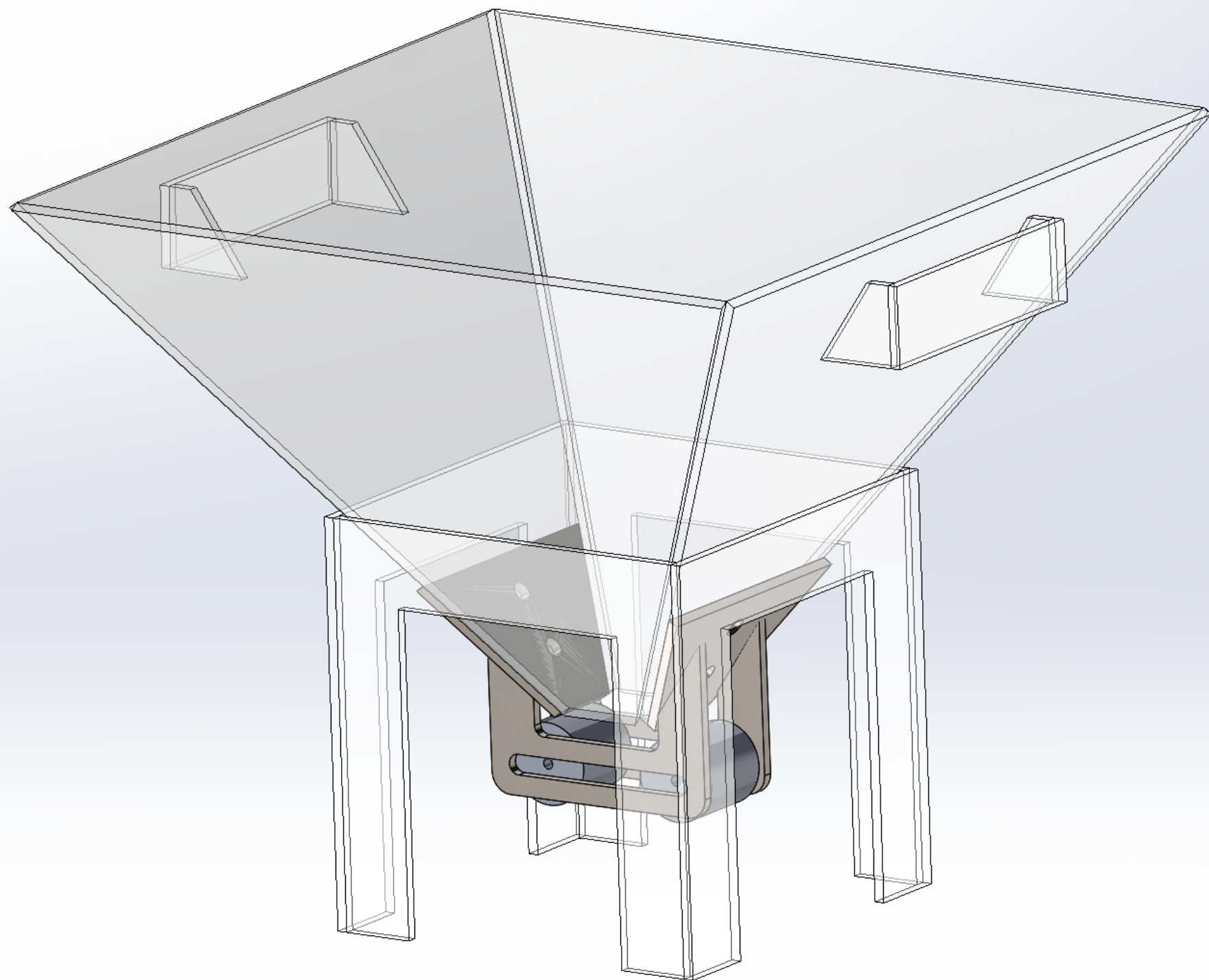


ABRASION PLATE AND PERFORATED BOWL:



- Fish are poured onto abrasion plate where they are punctured by rollers
- Overflow plate catches the fish, and they slide into the vaccine bowl
- A perforated bowl inside of the vaccine bowl is attached with a hinge that allows fish to be poured out

LAB TEST MODEL



- **Stand and Funnel Material:** Acrylic
- **Roller Mounts:** Stainless Steel
- **Weight of Funnel with Rollers:** 1 lb. 8 oz.
- **Top Opening Dimension:** (10 x 10) in.
- **Bottom Opening Dimension:** (1 x 1) in.
- **Stand Height:** 5 in.
- **Stand Width:** (5 x 5) in.
- **Distance of Rollers from Bottom of Tank:** 1.25 in.

DESIGN VALIDATION

- Fish carcasses : 7/24/2020
- Lab Test prototype : 8/7/2020
- Fish carcasses : 9/18/2020
- Initial prototype : 9/18/2020
- Final prototype : 11/13/2020

LAB PROTOTYPE VALIDATION

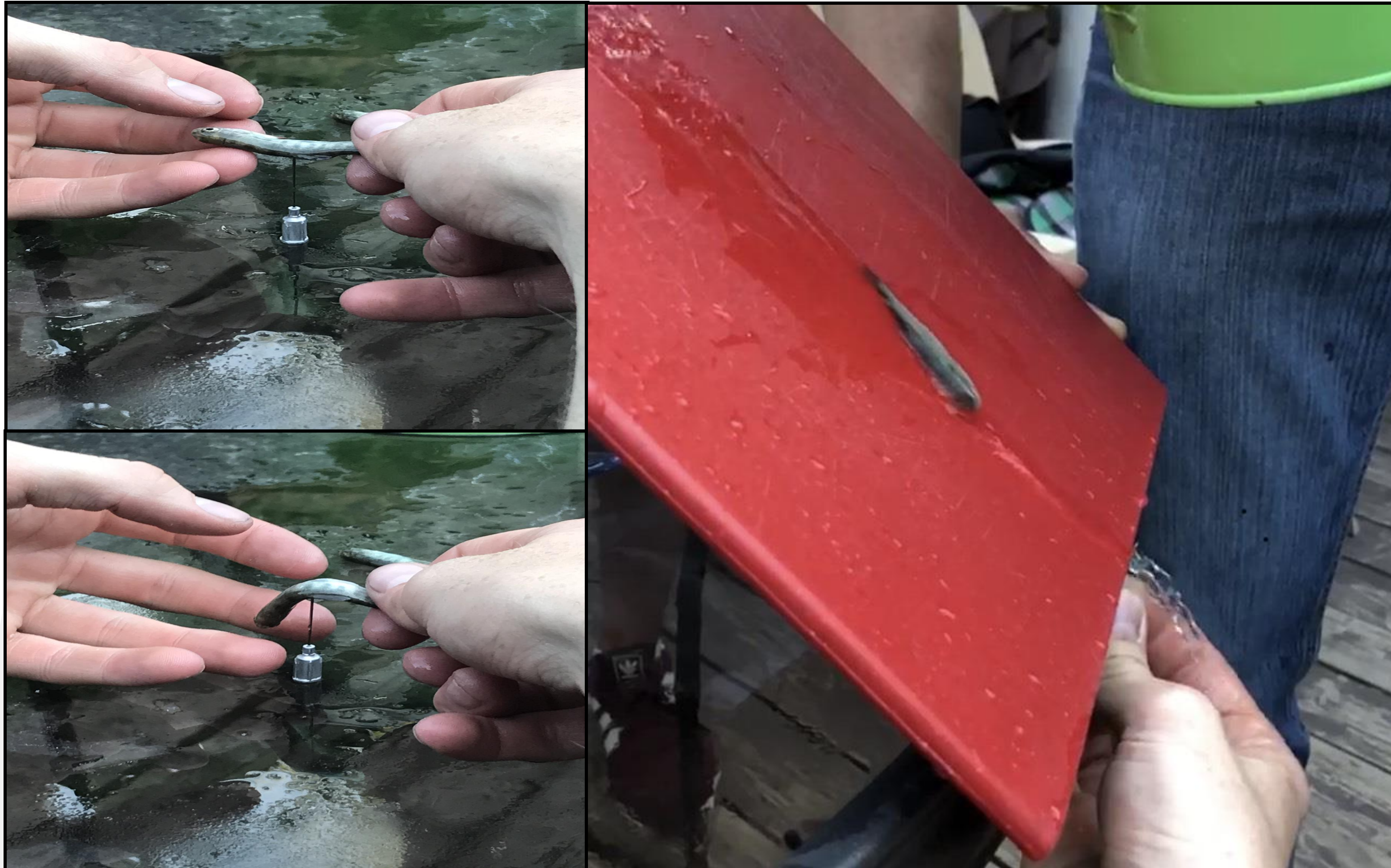
Before we can start work on our final prototype,, we have a few steps first...

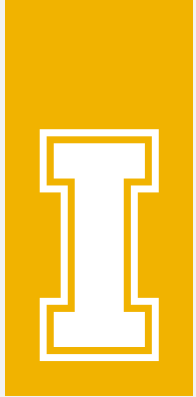
- Institutional Animal Care and Use Committee (IACUC)
- Proof of design and concept effectiveness

Once this is completed, we will be able to start testing and move forward with our final design.



FISH SKIN PUNCTURE EXPERIMENT





PROJECT MANAGEMENT

BUDGET

[illegible]



PROJECT MANAGEMENT

SCHEDULE

Fish-Vac Project Schedule																		Complete																
				Project: Alternate Aquaculture Vaccine Delivery System														In Progress																
				Last Updated: 7/2/2020														Future																
			Year	2020																														
			Month	June			July				Aug				Sept				Oct				Nov											
Milestones	Task Description	Duration	Assign To	6/15	6/22	6/29	7/6	7/13	7/20	7/27	8/3	8/10	8/17	8/24	8/31	9/7	9/14	9/21	9/28	10/5	10/12	10/19	10/26	11/2	11/9	11/16	11/23	11/30	12/7					
Snapshot 1																																		
7/13/2020	Define the requirements	2 Weeks	Ben		0%	100%																												
	Brainstorm concepts	3 Weeks	Team			0%	50%	100%																										
	Initial Plan for Development	3 Weeks	Cody				0%	50%	100%																									
Snapshot 2																																		
8/6/2020	Design Validation	3 Weeks	Ben/Cody					0%	50%	100%																								
	Needle Testing	2 Weeks	Team					0%	100%																									
	Initial Design Proposal	1 Weeks	Team						100%																									
	Value Proposition	2 Weeks	Khari							0%	100%																							
	Lab Test Prototype	5 Weeks	Ben						0%	25%	50%	75%	100%																					
	Lab Testing	6 Weeks	Ben								0%	20%	40%	60%	80%	100%																		
7/27/2020	Concept Design Review (Bench Test Model)	2 Weeks	Cody						0%	100%																								
Snapshot 3																																		
10/15/2020	Engineering Release (Drawings)	6 Weeks	Hasan									0%	20%	40%	60%	80%	100%																	
	Prototype test results	1 Weeks	Team															100%																
	Final prototype design validation	1 Weeks	Cody															100%																
Snapshot 4																																		
12/6/2020	Final Protoype	11 Weeks	Ben													0%	11%	22%	33%	44%	55%	66%	77%	88%	100%									
	Validation and Testing	4 Weeks	Team																						0%	33%	66%	100%						
	Final Portfolio	3 Weeks	Cody																							0%	50%	100%						

WHERE DO WE GO FROM HERE

FINAL PROTOTYPE



- Increased size to handle more fish
- Implements a pump and nozzles to help move fish through the chute
- Can be carried by 1 person
- Adjustable frame for a range of tank sizes
- Chute separates from frame to make the system easier to transport

QUESTIONS?